WE CLAIM:

1. A polynucleotide encoding a variant of a wild-type human α7 subunit, wherein the polynucleotide encodes a polypeptide having an amino acid substitution at position valine-274 of the wild-type human α7 subunit polypeptide, and degenerate variants thereof.

2. The polynucleotide of claim 1, wherein the polynucleotide is a polydeoxyribonucleotide (DNA).

3. The polynucleotide of claim 1, wherein the polynucleotide is a polyribonucleotide (RNA).

4. The polynucleotide of claims 1, 2 or 3, wherein the substitution is a threonine for valine-274.

5. A host cell comprising the polynucleotide of claim 1.

6. The host cell of claim 5, wherein said cell is selected from the group consisting of a bacterial cell, a mammalian cell, a yeast cell, an amphibian cell and a starfish cell.

7. The host cell of claim 6, wherein the cell is an amphibian cell.

8. The host cell of claim 6, wherein the cell is a mammalian cell.

9. An expression vector comprising the polynucleotide of claim 1 operably linked to control sequences that direct the transcription of the polynucleotide whereby said polynucleotide is expressed in a host cell.

10. The expression vector of claim 9, wherein the variant human α7 subunit is the human α7V274T subunit.

11. A host cell comprising the expression vector of claim 9.

12. The host cell of claim 11, wherein the cell is selected from the group consisting of a bacterial cell, a mammalian cell, a yeast cell and an amphibian cell.

13. The host cell of claim 12, wherein the cell is an amphibian cell.

14. The host cell of claim 12, wherein the cell is a mammalian cell.

15. A host cell comprising the expression vector of claim 10.

16. The host cell of claim 15, wherein the cell is selected from the group consisting of a bacterial cell, a mammalian cell, a yeast cell and an amphibian cell.

17. The host cell of claim 16, wherein the cell is an amphibian cell.

18. The host cell of claim 16, wherein the cell is a mammalian cell.

19. A method for producing a variant human α7 receptor, comprising:

(a) culturing the host cell of claim 11 under conditions that allow the production of the variant human α7 receptor; and

(b) recovering the variant human α7 receptor.

20. A method for producing a variant human α7 receptor, comprising:

(a) culturing the host cell of claim 15 under

conditions that allow the production of the variant human α7 receptor; and

(b) recovering the variant human α7 receptor.

21. An isolated and purified variant human α7 subunit, wherein the variant human α7 subunit comprises an amino acid substitution at position valine-274 of the wild-type human α7 polypeptide.

22. The variant human α7 receptor of claim 21, wherein the substitution is a threonine for valine-274.

23. A method for identifying compounds that modulate nicotinic acetylcholine receptor (nAChR) activity, comprising:

(a) providing a cell that expresses a variant human α7 nicotinic acetylcholine receptor (nAChR) polypeptide having an amino acid substitution at position valine-274 of the wild-type human α7 nAChR polypeptide;

(b) mixing a test compound with the cell; and

(c) measuring either

(i) the effect of the test compound on the variant α7 subunit or the cell expressing said subunit, or

(ii) the binding of the test compound to the cell or the receptor.

24. The method of claim 23, wherein the host cell is selected from the group consisting of a bacterial cell, a mammalian cell, a yeast cell, an amphibian cell and a starfish cell.

25. The method of claim 23, wherein said measurement of step (c) (ii) is performed by measuring a signal generated by a detectable moiety.

26. The method of claim 25, wherein said detectable moiety is selected from the group consisting of a fluorescent label, a radiolabel, a chemiluminescent label and an enzyme.

27. The method of claim 23, wherein said measurement of step (c) (i) is performed by measuring a signal generated by a radiolabeled ion, a fluorescent probe or an electrical current.

28. The method of claim 24, wherein the host cell is a mammalian cell.

29. The method of claim 24, wherein the host cell is an amphibian cell.

30. The method of claim 23, wherein the substitution is a threonine for valine-274.

31. A method for identifying a cytoprotective compound, comprising:

(a) providing a cell that expresses a variant human α7 subunit polypeptide or fragment thereof having an amino acid substitution at position valine-274 of the wild-type human α7 subunit polypeptide;

(b) combining a test compound with the cell; and

(c) monitoring the cell or cellular function for an indication of cytotoxicity.

32. The method of claim 31, wherein the cell is selected from the group consisting of a bacterial cell, a mammalian cell, a yeast cell, an amphibian cell, and a starfish cell.

33. The method of claim 32, wherein the cell is a mammalian cell.

34. The method of claim 32, wherein the cell is an amphibian cell.

35. The method of claim 31, 32, 33 or 34 wherein the substitution is a threonine for valine-274.

36. The method of claim 31, wherein the cell

comprises an expression vector comprising the polynucleotide of claim 1 operably linked to control sequences that direct the transcription of the polynucleotide whereby said polynucleotide is expressed in a host cell.

37. The method of claim 36, wherein at least one of the control sequences comprises an inducible promoter.

38. The method of claim 37, wherein said cell is maintained in the presence of a substance such as to minimize or block a cytotoxic effect on said cell.

39. A compound useful for treating conditions associated with neurodegenerative processes, enzymatic function, affective disorders or immuno function, comprising a composition that regulates the function of the α7 variant.

40. A method of treating an individual having a condition associated with neurodegenerative processes, enzymatic function, affective disorders or immunofunction, comprising administering to said individual an effective amount of a compound that regulates the function of the α7 variant, in a pharmaceutically acceptable excipient.

41. A method of treating an individual having a condition associated with neurodegenerative processes, enzymatic function, affective disorders or immunofunction, comprising administering to said individual an effective amount of a compound that controls the gene expression of the α7 variant, in a pharmaceutically acceptable excipient.

42. A method of detecting target polynucleotides of human variant α7 subunit in a test sample, comprising:

(a) contacting a target polynucleotide of human variant α7 subunit with at least one human variant α7 subunit-specific polynucleotide (probe) or complement therof; and

(b) detecting the presence of the target polynucleotide and probe complex in the test sample.

43. A method for detecting cDNA of human variant α7 subunit mRNA in a test sample, comprising:

(a) performing reverse transcription in order to produce cDNA;

(b) amplifying the cDNA obtained from step (a);

(c) detecting the presence of the human variant α7 subunit in the test sample.

44. The method of claim 43, wherein said detection step (d) comprises utilizing a detectable moiety capable of generating a measurable signal.

45. A purified polynucleotide or fragment thereof derived from human variant α7 subunit capable of selectively hybridizing to the nucleic acid of human variant α7 subunit, wherein said polynucleotide is SEQUENCE ID NO:___or a fragment thereof.

46. The purified polynucleotide of claim 45 wherein said polynucleotide is produced by recombinant techniques.

1 ~~47~~. A polypeptide encoded by human variant α7 subunit polynucleotide wherein said polypeptide is SEQUENCE ID NO:2. ~~or fragments thereof~~

2 ~~48~~. The polypeptide of claim 1 ~~47~~ produced by recombinant techniques.

3 ~~49~~. The polypeptide of claim 1 ~~47~~ produced by synthetic techniques.

50. A monoclonal antibody which specifically binds to human variant α7 subunit having amino acid sequence SEQUENCE ID NO:___ or fragments thereof.

51. A method for detecting human variant α7 subunit in a test sample, comprising:

(a) contacting said test sample with an antibody or fragment thereof which specifically binds to human variant α7 subunit, for a time and under conditions sufficient for the formation of resultant complexes; and

(b) detecting said resultant complexes containing said antibody, wherein said antibody specifically binds to human variant α7 subunit SEQUENCE ID NO:___ or fragments thereof.